DECLARATION

I, the undersigned Jeremy M. Topaz, a citizen of Israel residing at 8 Tor Ha-Aviv St., Rehovot, Israel, hereby declare as follows:

1. I hold a Master's degree in Electronics from the Massachusetts Institute of Technology. I am currently employed as a Senior Scientist and System Engineer at El-Op Ltd., one of the major electro-optical companies in the world. I have been and I am currently involved in the development, design, performance analysis and testing of electro-optical systems working in the visible, infrared and ultraviolet spectral regions, especially for space remote sensing and aerial reconnaissance image intelligence. One of the projects in which I play a major role is a UV space telescope for astronomical observation. I am familiar with the characteristics of different types of imaging sensors and with the many problems that are encountered in the implementation of electro-optical systems and the methods used to overcome them.
   My CV is attached to this declaration as Annex A.

2. I am aware of and understand the objections of the USPTO Examiner to granting a patent on U.S. Patent Application Serial Number 09/744,148 to Elstein, et al. (referred to hereafter also as "the application") as stated in the Office Action date November 2, 2005. The objection of the Examiner is based on the holding that the subject matter of Independent claims 1, 8, and 35 would have been obvious to persons skilled in the art in view of the knowledge available at the time of the invention, and particularly in view of the teachings of US Patent 5,841,574 (referred to hereafter as "Willey"), and US Patent No. 5,001,348 (referred to hereafter as "Dirscherl").

3. I have been requested by the Applicant to study and comment on the application, on US 5,001,348, on US 5,841,574, on the state of knowledge at the time of the Applicant's invention. I have been requested to particularly comment on the lack of inventiveness rejection of

independent claims 1, 8, and 35 of the application in view of Dirscherl and in view of Willey.

4. Having read and understood the application, and having received the amended set of claims as now being submitted to the USPTO, I learned from amended independent claims 1, 8, and 35 that the object of the Elstein et al invention is to provide an apparatus that enables viewing in real-time of an image of a UV radiation source in daylight, wherein this UV image is overlaid in exact registration and with no parallax on a visible image showing in real-time the details of the background scenery. From the examples given in the application, I learned that all these features enable utilizing the apparatus in various applications, such as viewing in daylight and determining in real time the exact location of corona that is formed on electricity transmission lines and towers, following in daylight and in real time a car which is provided with a UV emitter, etc. More particularly, I learned that the above features enable determination of the exact location of the UV emitting source with respect to the visual or IR scenery. From the application it is possible to learn that in the case of corona discharges on high voltage transmission lines and towers in daylight, viewing in real time of the details of the visual background and the exact registration are very essential. In my opinion these features are essential also in all the other uses of the system as described in the application.

5. From the description, and from the amended independent claims 1 8, and 35 of the application, I learned that the above objects are obtained by means of acquiring an image from the scene using two separate imaging units, a solar blind UV (SBUV) imaging unit, and a visible (or IR) imaging unit. The two imaging units operate simultaneously, and they acquire their images through the same aperture and along the same optical axis. The SBUV imaging unit includes at least an SBUV filter and a UV photocathode and has very low or zero sensitivity in the visible region and near IR regions. The two images as simultaneously acquired by the SBUV imaging unit and by the visible imaging (or IR) unit are

then combined in real time, or more particularly, the first image as obtained from the SBUV imaging unit is overlaid in real time over the second image obtained from the visible or IR imaging unit thereby forming in real time one combined and exactly registered visual image showing in real time the UV source in its exact position within the background scenery and with no parallax.

6. I learned that the Elstein et al application not only clearly shows how the combination of the two spectral images from the two separate imaging units, the SBUV imaging unit and the visible or IR imaging unit, is made, it also shows how to provide it in real time, and the application also provides clear and very valuable results of experiments which have been made (see for example Figs. 6C, Fig. 7, Figs. 8B, Figs. 9B, and Figs 10A and their related text pages 40-43), which show how corona having a very weak UV illumination or other UV sources such as a UV mercury lamp, alcohol and hydrogen flames, and a distant fire can be detected located and visualized in daytime and in real time. I believe that Willey's disclosure cannot be interpreted as an indication or teaching for "*combining in real time the images as obtained by said simultaneous imaging through a common aperture and in a common optical axis, by overlaying in real time a first image obtained from said first imaging unit over a second image obtained from said second imaging unit thereby forming one combined and exactly registered visual image showing in real time the UV emittance in its exact position within the background scenery of the scene and with no parallax*" as in amended claim 1 (and similarly in claims 8 and 35). Whoever is familiar with airborne reconnaissance systems such as the system of Willey (see, for example, col. 1 lines 28+, col. 2, lines 54+, etc.), knows that such a system accumulates a mass amount of image data, and stores the accumulated data in a mass storage for further future processing. Willey also implies that this is the case by stating in col. 6 line 11 that his system ".... *is capable of collecting the imagery to be used for sensor fusion...*". Willey mentions in his abstract "*aerial reconnaissance camera systems,*

spectrum analyzers, astronomical imagers, remote sensing and other applications is described". It should be noted that in a spectrum analyzer, the data from various bands is collected, analyzed and presented as a spectrum of each pixel. In an astronomical imager, images are collected over long times to achieve the necessary sensitivity. In remote sensing, as in aerial reconnaissance, push-broom or panoramic scanning is used to cover large areas for later analysis. None of these applications are suitable for, or operate in real-time data fusion. The "*other applications*" are not defined, and lacking any indication to the contrary, and in accordance with the applications described in Willey patent which relate to long range aerial reconnaissance detection systems, this term is to be interpreted in a same manner to non-real time systems. All the applications mentioned in the invention and in the claims relate to aerial reconnaissance and astronomical imaging systems. It is therefore clear to me that Willey's system cannot at all display any multi-spectral view of any type in <u>real time</u>, and obviously not of UV emission with IR or visible scenery in daylight, even when combined with teaching from Dirscherl. It is known in the art that, in an aerial reconnaissance camera system, the image of the scene moves rapidly across the sensor because of the forward motion of the aircraft or because of the panoramic scanning perpendicular to the motion. This enables the camera to acquire images of a large area in a relatively short time. However, these images are <u>always</u> recorded for <u>later viewing</u>, even if a moving ("waterfall") display in one wavelength band in which the image moves rapidly across the screen, is provided solely for monitoring the orderly operation of the system in "real time". This is because examination of the image to look for information ("Image Intelligence" or IMINT) can only be carried out on a stationary image. Moreover, the fact that Willey's reconnaissance system is designed for operation from an airplane, forces an extremely short period during which the sensor samples each ground scene element. Therefore, any attempt to make the system of Willey to operate in real-time will be useless in my opinion, in view of the extremely high rate of collecting images of rapidly changing

ground sceneries. Furthermore, if the camera records images in two or more wavelength bands simultaneously, the ground sampled distance (GSD) in the two images is not normally the same, for example visible and infra-red detectors, the latter having typically larger pixels and a larger GSD than the visible channel and the difference is even much larger when IR and UV detectors are used. Conversion of one image to match the GSD of the other and registration of the images is necessary before image fusion can be implemented. This cannot be done in real time. While referring to an aerial reconnaissance system, Willey mentions a linear sensor array (see col. 1, line 12). In aerial reconnaissance and remote sensing systems, where the image of the scene moves rapidly across the sensor, mainly linear sensors are used to enable acquiring images of large areas in short time. Such a use of linear sensors that are typical to air reconnaissance is repeated in column 9, line 38 to line 45: "*In the preferred embodiment, the visible and near IR detector 29 is preferably a linear electro-optical detector and is oriented perpendicular to the XZ plane. Similarly the MWIR or LWIR detector 50 is preferably also a linear electro-optical detector and is oriented perpendicular to the XZ plane*", and Also in Column 10 lines 13 to 15: "*Note that in Figs. 9 and 11 the detectors 29 and 50 are linear devices with their long axis perpendicular to the plane of the page*". Similar references to linear sensor arrays detectors and limited area array devices can be found also in other places within Willey's patent and claims. Therefore, from the above it is clear to me that the system of Willey is not suitable for real time data fusion, and a hypothetical transfer of such system to real time requires very substantial efforts and teachings, that obviously have not been provided in Willey's patent. Therefore, it is my belief that there is no way but to conclude that Willey's patent does not relate to any real-time operation.

7. As a scientist who has been actively engaged in research and development in air reconnaissance for a very long time, I conclude that the Willey's and Dirscherl patents either taken alone or in combination

are far from providing a solution to the problems that Elstein et al solve (for example, detecting locating and visualizing of a corona on HV lines in daylight and in real time). I arrived at this conclusion because even when the teaching from said publications are combined, they still cannot provide a combined overlaid image showing the UV emittance and visible or IR scenery in real time, as required by amended claims 1, 8, and 35.

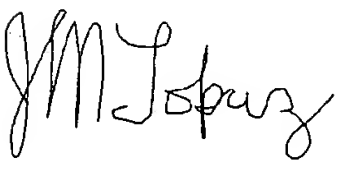
8. As far as I am familiar with the state of the art prior the filing date of the Elstein application, the invention of Elstein has provided a solution to a series of applications that could not be carried out without it. For example, the detection and location of corona on HV lines in daylight, and with a very high accuracy, could not be performed prior the date of the application. Therefore, it seems to me that the invention of this application is both novel and inventive in view of the patents of Dirscherl and Willey.

9. I hereby declare that all statements made herein of my own knowledge are true and that all statements made herein on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the subject application or any patent issuing thereon.

10. The name and signature below are my name and signature.

This February 23, 2006,

Jeremy M. Topaz



Curriculum Vitae, July 2005

Name: **Jeremy Topaz**

Education: M.S. in Electrical Engineering from MIT, Cambridge, MA
Thesis subject: "An opto-mechanical stylus to aid the blind in sensing images".

B.Sc (EE) Newcastle University, Newcastle, UK

Current Role Chief Scientist, Remote Sensing Operation, ELOP

Employment and experience

1989 - present **El-OP Electro-Optical Industries Ltd. Rehovot, Israel**
As a senior scientist in the Remote Sensing Operation, was involved in the design and testing of electro-optical systems for space projects and system engineer of the TAUVEX ultra-violet astronomical space telescope project. Currently function as System Engineer in a remote sensing satellite camera being developed together with CNES (French Space Research Centre) and IAI (Israel).

1988-1989 **Orbot Instruments Ltd.**
Seconded to Orbot as member of joint development team of El-Op and Orbot working on development of wafer inspection system.

1985-1988 **El-OP Electro-Optical Industries Ltd. Rehovot, Israel**
System Engineer in the Remote Sensing Operation, was involved in the design of electro-optical systems for space projects.

1983 -1985 **Ministry of Defense R & D Administration.**
On leave of absence from El-Op, responsible for the supervision of R & D projects in the field of Night Vision, Lasers and other military EO systems.

1980 - 1983 **El-Op Ltd. (After merger of RIL with El-OP)**
Head of Electronics Department of RIL Division, supervision of Development activities.

1966 - 1979 **Rehovot Instruments Ltd.**
Initially, as development engineer, was involved in development of electro-optical scientific instrumentation. Developed an electronic intruder detection system. After this, participated in a variety of innovative development programs for military applications of infra-red, in fields such as intruder detection, missile detection, thermal night vision, etc. As senior engineer, was project manager for several of these programs.

1964 - 1966 **Block Engineering, Cambridge, MA.**
Development engineer on electro-optical instrumentation projects involving Fourier and Fabry-Perot spectroscopy.

1960 - 1964 **Polaroid Corporation, Cambridge, MA**
Development of instrumentation for film and camera testing.. Development of exposure control for worlds first electronically controlled amateur camera shutter.

1956 - 1960 **Weizman Institute of Science, Rehovot, Israel**
Applied Maths Dept. Development, operation and maintenance of instrumentation for geophysical oil exploration.
Physics Dept: Development of the control system for an IR spectrometer for study of refraction in gases.

Publications

1. "Detection and Recording of Images in TAUVEX" - Jeremy Topaz, IEEE, Tel Aviv, 1992
2. "TAUVEX: UV Space Telescope" - Jeremy Topaz and Avi Huppert, SPIE 1764-09, San Diego, July 1992
3. "A fixed-focus camera objective for small remote-sensing satellites" - Jeremy M. Topaz, Ofer Braun and Dov Frieman, SPIE 1740-15, San Diego, July 1992
4. "Novel static horizon sensor for small satellites" - Jeremy Topaz and Ofer Braun, SPIE 1971-38/Optical Engineering, Tel-Aviv, Dec 1992
5. "TAUVEX UV Astronomical Telescope" - Jeremy Topaz, Ofer Braun and Noah Brosch, SPIE 1971-37/Optical Engineering, Tel-Aviv, Dec 1992
6. "Methods of autonomous correction of errors due to the variations of the IR horizon profile shape in static Earth horizon sensors" - Vladimir Alperovitch and Jeremy Topaz
7. "The TAUVEX experiment" - Noah Brosch, Amotz Shemi, Jeremy Topaz and Ofer Braun - ESA symposium on Photon Detectors for Space Instrumentation, Dec, 1992
8. "Calibration of UV imaging sensors in TAUVEX" - Ofer Braun and Jeremy Topaz, SPIE Orlando, April 1993,
9. "The TAUVEX Space Astronomy Experiment" - Noah Brosch, Amotz Shemi, Avigdor Blasberger and Jeremy Topaz- IAF Symposium, Jerusalem, 1994

Articles in magazines including "Laser Focus World", "Military Technology" and several Israeli Publications.

Patents

Four patents in the field of Camera Exposure Control, assigned to Polaroid Corporation

Awards

"Product Design" magazine Prize for development of electronic shutter control (as part of a team at Polaroid Corporation).

Israel Defense Prize, 1972